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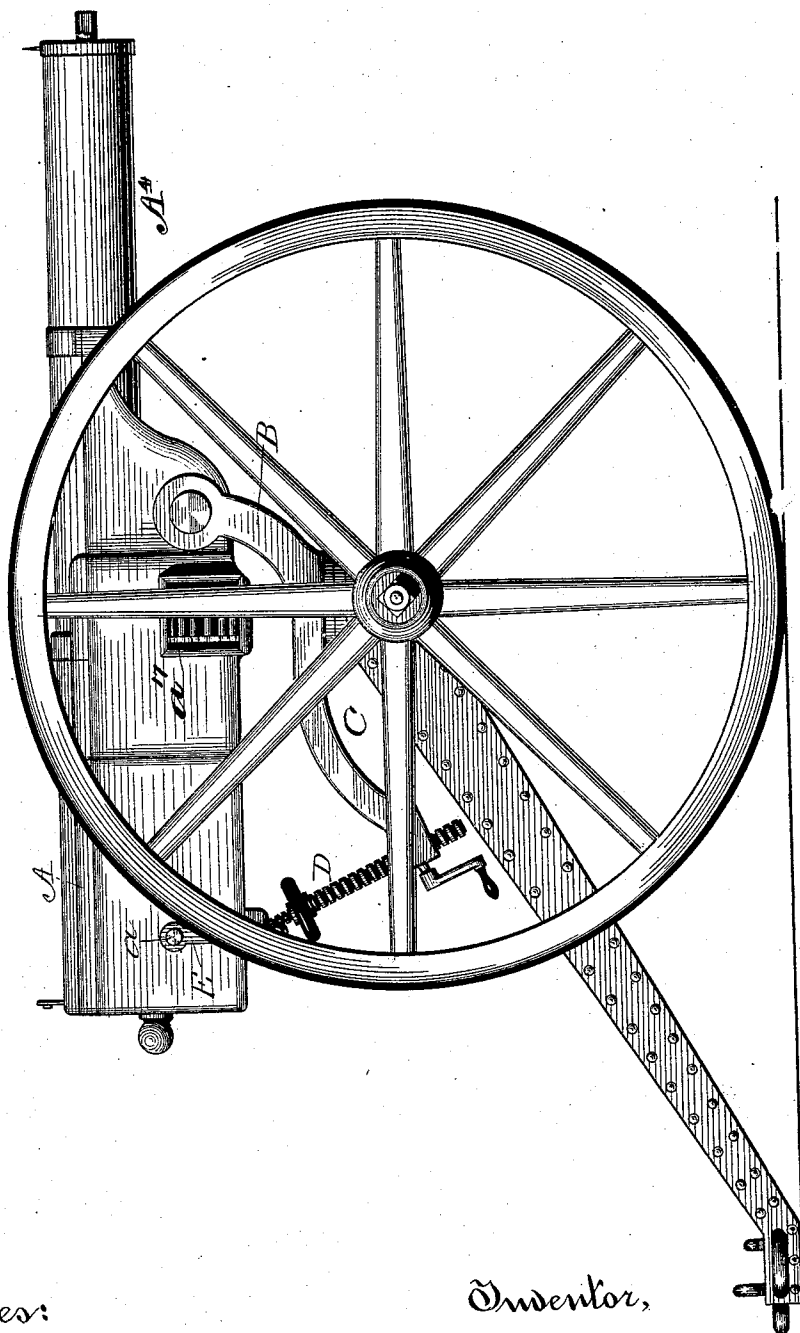
7 Sheets—Sheet 1.

F. M. GARLAND.  
MACHINE GUN.

No. 475,276.

Patented May 17, 1892.

Fig. 1



Witnesses:

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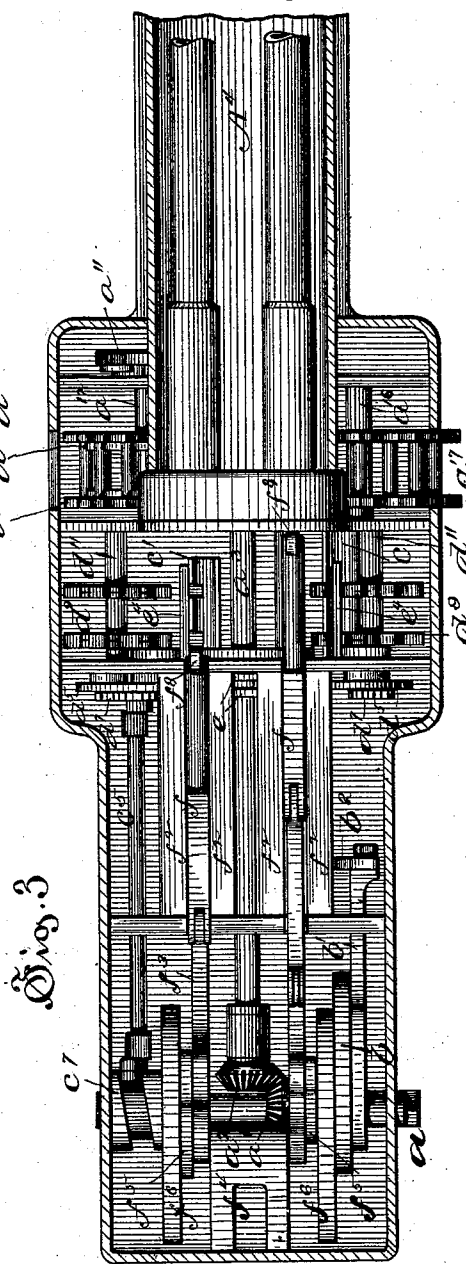
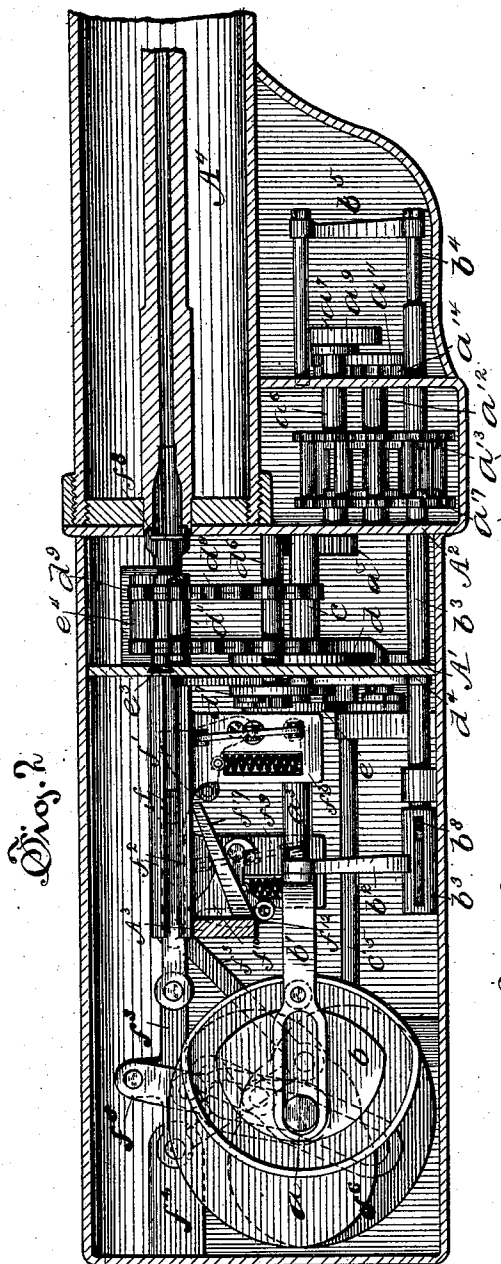
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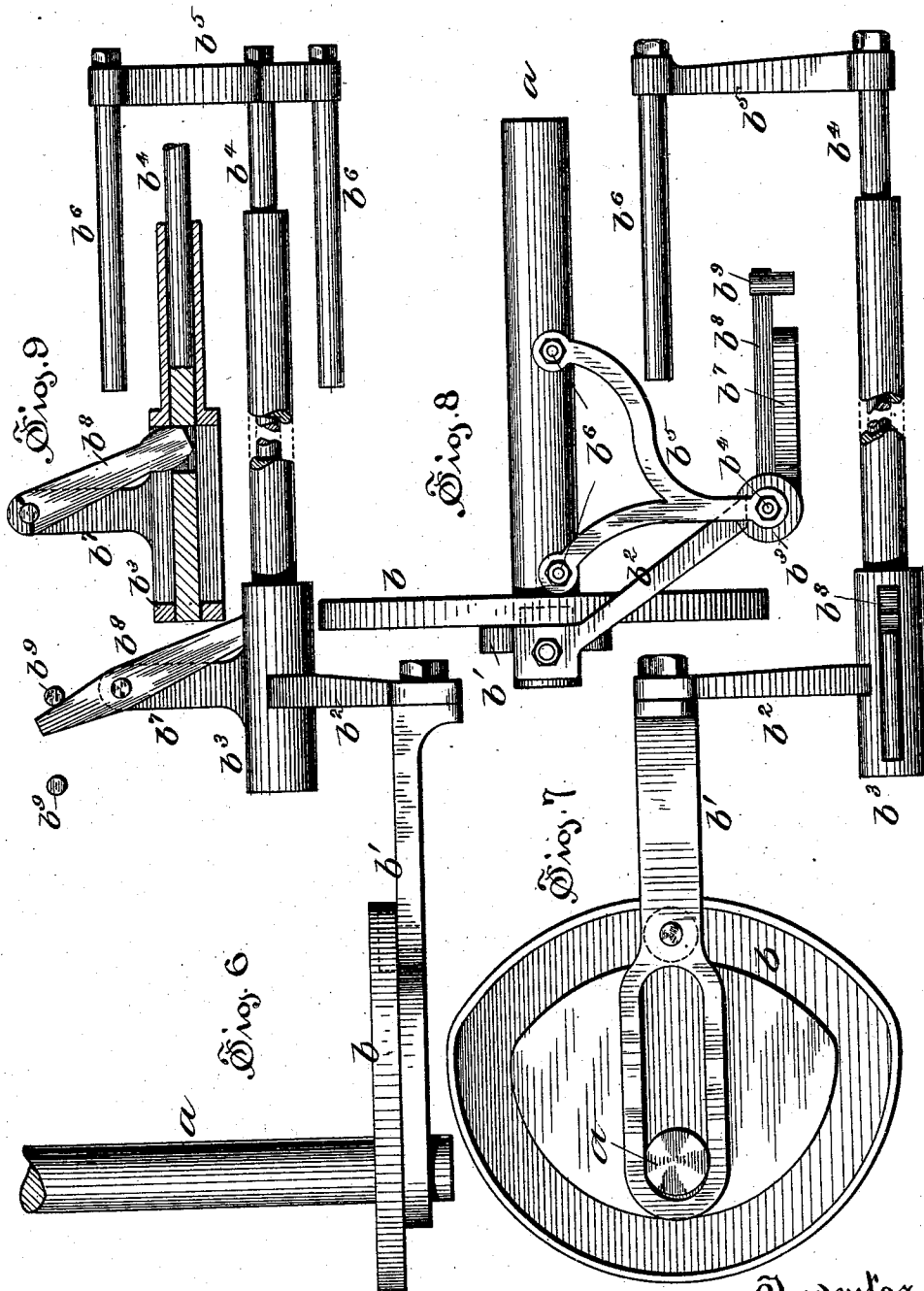
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7 Sheets—Sheet 4.

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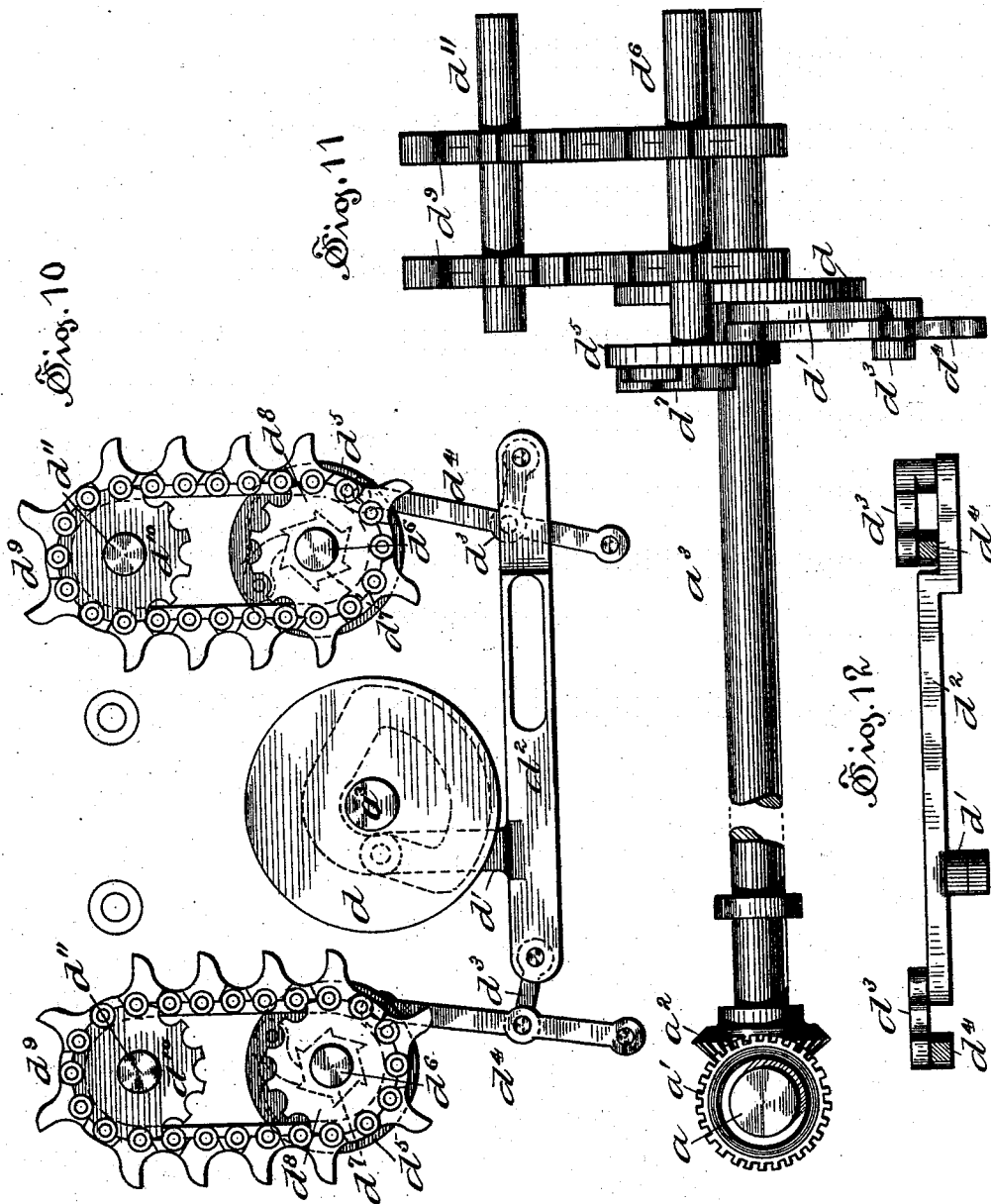
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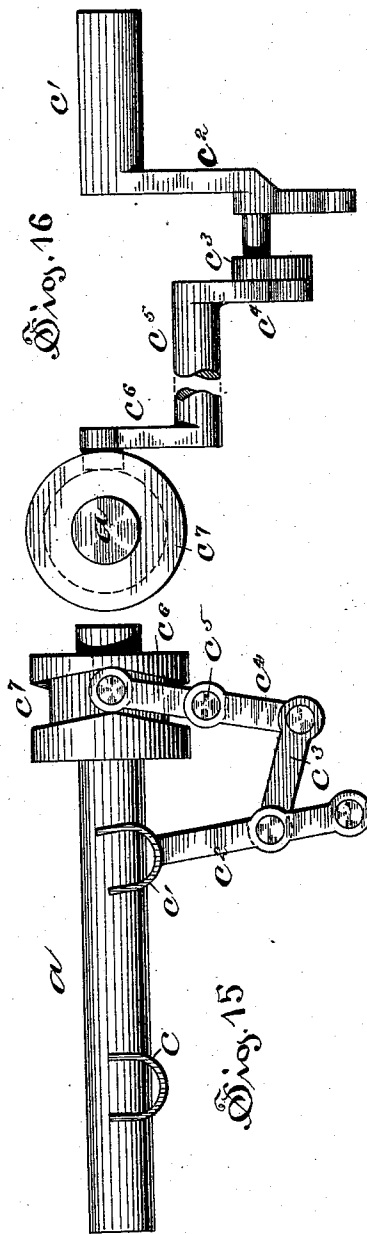
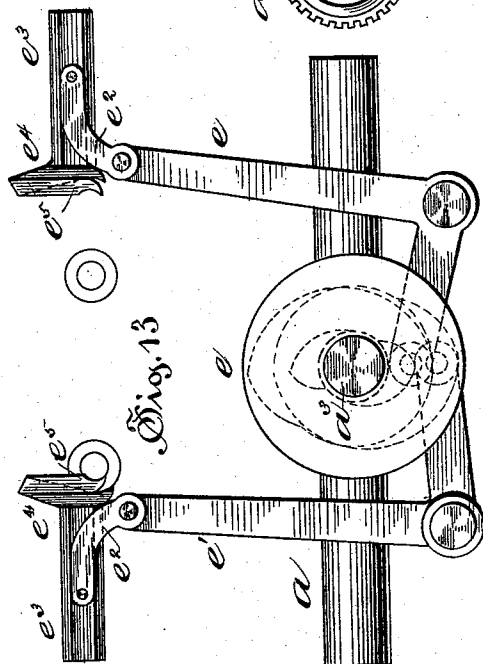
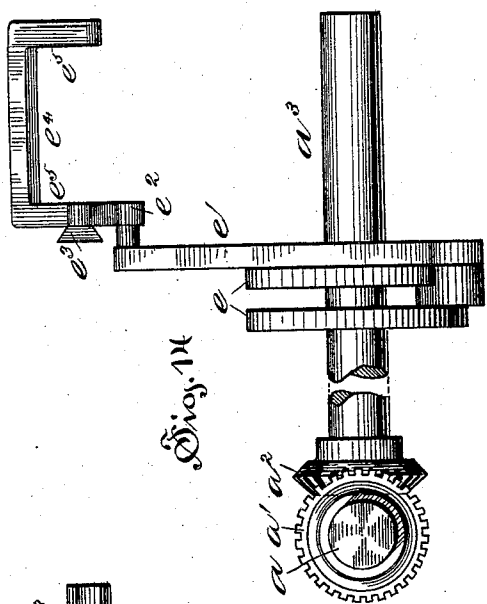
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7 Sheets—Sheet 6.

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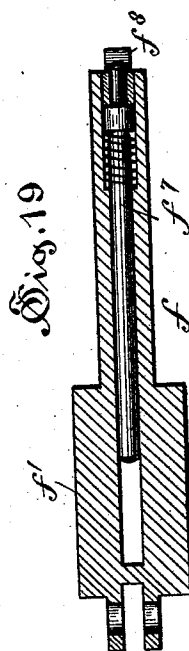
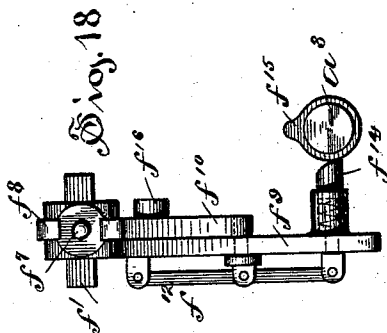
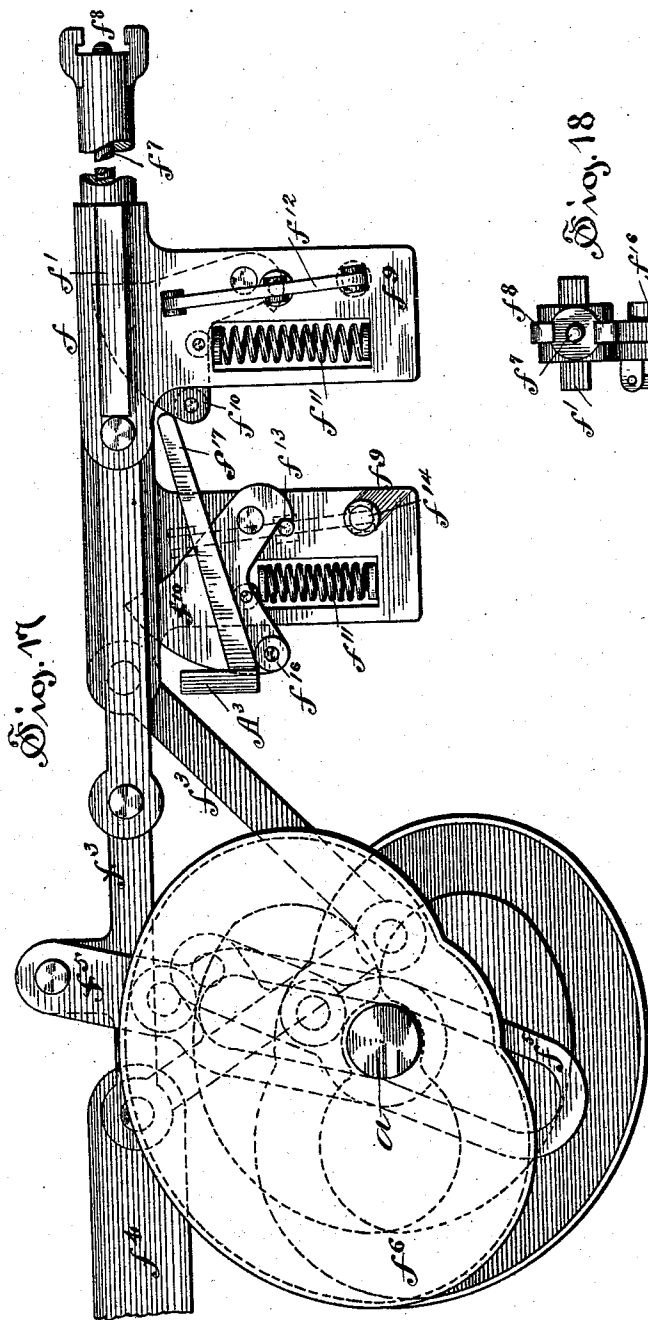
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# UNITED STATES PATENT OFFICE.

FRANK M. GARLAND, OF NEW HAVEN, CONNECTICUT.

## MACHINE-GUN.

SPECIFICATION forming part of Letters Patent No. 475,276, dated May 17, 1892.

Application filed April 29, 1891. Serial No. 390,893. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK M. GARLAND, a citizen of the United States, residing at New Haven, in the county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Machine-Guns, of which the following is a full, clear, and exact specification.

My invention relates to the class of automatic machine-guns having stationary barrels; and the object is to provide a simple, cheap, positive-feeding, and rapid-firing gun of this class wherein one or both barrels may be used for firing, which is so constructed that there will be no danger that a shell will stick in the barrels and clog the mechanism, and which can at will quickly be totally disabled.

Referring to the accompanying drawings, Figure 1 is a side elevation of the gun. Fig. 2 is an enlarged side elevation with the casing and several of the parts cut in section. Fig. 3 is a plan of the same. Fig. 4 is an enlarged elevation looking toward the butt of the feed-chain and its operating mechanism. Fig. 5 is a side elevation of the same. Fig. 6 is a plan of the pushers for removing the cartridges from the chain and their reciprocating mechanism. Fig. 7 is a side elevation of the same. Fig. 8 is a front elevation of the same. Fig. 9 is a detail section of a portion of the same. Fig. 10 is an elevation looking toward the butt of the cartridge-lifting chains and their mechanisms. Fig. 11 is a side elevation of the same. Fig. 12 is a detail plan of a portion of the same. Fig. 13 is an elevation looking toward the butt of the cartridge-aligners and their sliding mechanism. Fig. 14 is a side elevation of the same. Fig. 15 is an elevation looking toward the butt of the revolving spoons and operating mechanism. Fig. 16 is a side elevation of the same. Fig. 17 is a side elevation of the hammer-bearing spindles and their reciprocating mechanism. Fig. 18 is a front elevation of the same. Fig. 19 is a detail section of one of the spindles.

In the views the letter A indicates the casing of the gun, the trunnions of which are held by any suitable mount B, borne by a common carriage C, that is provided with a desirable elevating device D. Near the rear of the casing is a transverse shaft  $a$ , having on the exterior a crank E for operating the

mechanism, as shown in Fig. 1. Near the middle of this shaft is a bevel-gear  $a'$ , meshing with a bevel-gear  $a^2$  on a longitudinal shaft  $a^3$ , bearing at the opposite end a pinion  $a^4$ , that meshes with a pinion  $a^5$  on a shaft  $a^6$ , that extends toward the front, where it bears a cam  $a^7$ . In contact with this cam is a roll  $a^8$  on a slide  $a^9$ , which is connected by a link  $a^{10}$  with a pawl-bearing leaf  $a^{11}$ , supported loosely upon a shaft  $a^{12}$ , that bears a roll  $a^{13}$ , provided with sprocket-teeth. The pawl is in contact with the teeth of a ratchet  $a^{14}$ , fast to the shaft  $a^{12}$ , so that upon the oscillation of the leaf the sprocket-wheel is rotated. Upon a shaft  $a^{15}$  upon the opposite side of the casing is a roll  $a^{16}$ , and over these rolls and adapted to be moved by the sprocket-teeth passes a feed-chain  $a^{17}$ , having arms for holding cartridges which are placed in them, as shown in Figs. 2, 3, 4, and 5. The rotation of the shaft  $a$  through the gears rotates the shaft  $a^3$ , which through the pinions rotates the shaft  $a^6$  and the cam  $a^7$ . The rotation of the cam through the slide oscillates the leaf, which by means of the pawl feeds the ratchet and gives to the chain an intermittent movement over the rolls.

Near one side the shaft  $a$  bears a cam  $b$ , in the groove of which runs a roll on a slide  $b'$ , to the forward end of which is connected an arm  $b^2$ , that is attached to the end of a sliding tube  $b^3$ , bearing a rod  $b^4$ , the end of which in front of the feed-chain supports an upright yoke  $b^5$  with rearward-projecting rods  $b^6$ . The rear end of the tube  $b^3$  bears an arm  $b^7$ , to which is pivoted a lever  $b^8$ , that projects through a slot in the tube  $b^3$  into a socket in the rod  $b^4$ . Posts  $b^9$  are placed in the path of the outer end of this lever  $b^8$ , as it is carried by the sliding tube, as shown in Figs. 2, 3, 6, 7, 8, and 9. Upon the rotation of the cam  $b$  the slide reciprocates the tube  $b^3$ , carrying the lever  $b^8$  and the rod  $b^4$ ; but when the end of the lever strikes one of the posts the rod  $b^4$  is thrust farther and faster forward or backward than it would be carried by the tube  $b^3$ , so that with but little throw of the cam  $b$  the rods  $b^6$  are given a reciprocating movement long enough to push the cartridges from the feed-chain into the receiving-spoons.

The spoon  $c$  is a trough supported by the partitions  $A'$   $A^2$ , that extend transversely of



the casing, while the spoon  $c'$  is borne by the upper end of a lever  $c^2$ , pivoted to the bottom of the casing. This lever is connected by the link  $c^3$  with a rocker-arm  $c^4$  on one end of the shaft  $c^5$ , which has on its opposite end an arm  $c^6$  in contact with the cam  $c^7$  on the shaft  $a$ , as shown in Figs. 2, 3, 5, and 16. As the shaft  $a$  revolves the shaft  $c^5$ , by means of the rocker-arms, oscillates the lever and swings the spoon  $c'$  from the position in which it receives a cartridge into the path of the arms projecting from the lifting-chain. The lifting-chains on moving upward pass through slots in the edge of the spoons, lifting and carrying the cartridges to the level of the barrels.

The longitudinal shaft  $a^3$  bears in front of the partition  $A'$  a cam  $d$ , in the groove of which runs a roll on the end of an arm  $d'$  of a slide  $d^2$ , that travels in ways along the opposite face of the partition  $A'$ . Each end of this slide is connected by a link  $d^3$  with a lever  $d^4$ , pivoted at one end to the bottom of the casing and at the other end to a leaf  $d^5$  on a shaft  $d^6$ , supported by the partitions  $A'$ .  $A^2$ , one shaft being upon each side of the axis of the barrels. These leaves bear pawls that engage the teeth of ratchets  $d^7$ , fast to the shafts  $d^8$ , which bear disks  $d^9$ , having sprocket-teeth that mesh into the links of the chain  $d^9$ , that passes around these disks and similar disks  $d^{10}$ , mounted upon shafts  $d^{11}$ , supported by the same partitions as shown in Figs. 2, 3, 10, 11, and 12. As the shaft  $a^3$  and cam  $d$  are revolved by the crank through the beveled gears the slide is reciprocated and through the levers oscillates the leaves bearing the pawls, which by engagement with the oppositely-turned teeth of the ratchets rotate the shafts, giving to the lifting-chains alternately an upward intermittent movement.

The shaft  $a^3$  back of the partition  $A'$  bears a pair of cams  $e$ , in the grooves of which run rolls projecting from the bent levers  $e'$ , that are pivoted to the partition and connected by links  $e^2$  with slide  $e^3$ , adapted to travel in ways on the front of the partition. These slides carry aligners  $e^4$ , having legs  $e^5$ , adapted to fit the butt and ball ends of the cartridge, as shown in Figs. 2, 3, 13, and 14. The cams  $e$  are so timed as to give an alternate reciprocation to the aligners, which carry the cartridges from the lifting-chains to the grasp of the mortised end of the spindles in line with the barrels.

The spindles  $f$  have wings  $f'$ , adapted to slide in ways between plates  $f^2$ , supported by the partitions  $A'$   $A^3$ , and are connected by toggle-levers  $f^3$  with studs  $f^4$  at the butt of the gun. To the levers  $f^3$  are connected toggle-links  $f^5$ , having rolls that project into the grooves of the cams  $f^6$  on the shaft  $a$ , which are so timed that the toggles are opened and closed so as to reciprocate the spindles alternately. The spindles bear a firing-pin  $f^7$ , adapted to make contact with the end of the cartridge which is pushed into and held

by the mortised arms  $f^8$  on the front end of the spindles. Pivoted to plates  $f^9$  and adapted to swing into contact with the end of the firing-pins are hammers  $f^{10}$ , normally thrown upward by springs  $f^{11}$ . Upon the opposite side of the plates are levers  $f^{12}$ , having sears adapted to project into notches  $f^{13}$  of the hammers, and triggers  $f^{14}$ , adapted to project into the path of the cam  $f^{15}$  on the shaft  $a^3$ . The hammers have friction-rolls  $f^{16}$ , so located in the path of arms  $f^{17}$  that when the spindles move backward and the rolls run down the inclined arms the hammers are cocked and the sears spring into the notches, as shown in Figs. 2, 3, 17, 18, and 19. When the aligners force the cartridges into the grasp of the spindles, the spindles move forward and place the cartridges in the barrels, and when in this position the triggers lie in the path of the cam  $f^{15}$ , the rotation of which forces in the trigger, so as to draw the sear from the notch and allow the hammer to strike the firing-pin and explode the cartridge.

Cartridges which are held by a flexible belt are drawn into the gun by the feed-chain at the proper time. The pushers move backward and force two cartridges from the belt into the spoons, the movable one of which then moves into line with one of the lifting-chains. These chains take the cartridges from the spoons and lift them to the level of the barrels, from which position the cartridges are moved by the aligners into the grasp of the spindles, which then move forward and place the cartridges in the barrels, in which position they are exploded. After the cartridges are exploded the spindles withdraw and the next cartridge crowds from the spindle the empty shell, which falls through the center of the gun to the ground. The feed-chain is moved two spaces at each movement in order that one cartridge may pass the first push-rod to be acted upon by the second, and if it is desired to use but one barrel one of these push-rods is removed, thus passing the cartridges to but one of the barrels.

The barrels, which are secured to the front partition  $A^2$ , may be surrounded by any suitable water-jacket  $A^4$ .

I claim as my invention—

1. In a machine-gun, in combination, a feed-chain connected with the driving-shaft, movable transversely of the gun, pushers normally in front of and adjacent to the feed-chain, connected with and adapted to be reciprocated across the path of the feed-chain by the driving-shaft for passing the cartridges rearward from the feed-chain into the path of the lifting-chains, spoons  $c$  and  $c'$  for receiving the cartridges thus pushed, chains with carrying-arms back of the feed-chain, connected with and intermittently moved vertically by the driving-shaft for raising cartridges to the level of the barrels, and spindles bearing hammers and firing-pins connected with and reciprocated by the driving-shaft in line with the barrels, adapted to receive the cartridges

from the lifting-chains, substantially as specified.

2. In a machine-gun, in combination, a feed-chain connected with the driving-shaft, movable transversely of the gun, pushers normally in front of and adjacent to the feed-chain, connected with and adapted to be reciprocated across the path of the feed-chain by the driving-shaft for passing the cartridges rearward from the feed-chain into the path of lifting-chains, spoons *c* and *c'* for receiving the cartridges thus pushed, chains with carrying-arms back of the feed-chains, connected with and intermittently moved vertically by the driving-shaft for raising the cartridges to the level of the barrels, aligners connected with and transversely moved by the driving-shaft on the level barrels adjacent to the lifting-chains for straightening the cartridges in line with the barrels, and spindles having hammers and firing-pins connected with and reciprocated by the driving-shaft in line with the barrels, adapted to receive the cartridges from the lifting-chains, substantially as specified.

3. In a machine-gun, in combination with a transversely-moving feed-chain connected with the driving-shaft and receiving-spoons back of said chain, pushers normally in front of and adjacent to the feed-chain, said pushers consisting of rods for passing the cartridges rearward from the feed-chain into the path of lifting-chains, the rods being borne by a slide supported by an independent slide connected with and reciprocated by the driving-shaft, substantially as specified.

4. In a machine-gun, in combination with a transversely-moving feed-chain connected with the driving-shaft and receiving-spoons back of said chain, pushers normally in front of and adjacent to the feed-chain, said pushers consisting of rods for passing the cartridges rearward from the feed-chain into the path of lifting-chains, the rods being borne by a slide supported by and independently movable in a slide that is reciprocated by a cam on the driving-shaft and bears a lever that is connected with the rod-slide, whereby an independent movement is given to this slide by the lever while carried by the main slide, substantially as specified.

5. In a machine-gun, in combination with a transversely-movable feed-chain connected with the driving-shaft and receiving-spoons back of said chain, pushers normally in front of and adjacent to the feed-chain, said pushers consisting of rods for passing the cartridges rearward from the feed-chain into the path of lifting-chains, the rods being borne by a slide supported by and independently movable in a slide that is reciprocated by a cam on the driving-shaft and bears a lever that at one end is in connection with the rod-slide, while its other end terminates between two posts projecting from the casing, whereby an independent movement is given to the rod-slide by the contact of the lever with the posts

when carried by the main slide, substantially as specified.

6. In a machine-gun, in combination with a pair of lifting-chains connected with and moved vertically by the driving-shaft and a firing mechanism reciprocated by the driving-shaft in line with the barrels, a feed mechanism consisting of a pair of rolls bearing sprocket-teeth, a chain passing around the said rolls, a ratchet connected with one of the rolls and a pawl in contact with the ratchet, a slide for oscillating the pawl, and a cam for reciprocating the slide, said cam being revolved by the rotation of the driving-shaft, substantially as specified.

7. In a machine-gun, in combination with a transversely-moved feed-chain connected with the driving-shaft, lifting-chains with projecting arms back of the feed-chains, connected with and intermittently moved vertically by the driving-shaft, and pushers connected with and reciprocated by the driving-shaft, and a spoon in the rear of the feed-chain, connected with and oscillated by the driving-shaft from the path of a pusher into the path of a lifting-chain to carry a cartridge pushed from the feed-chain in one line to a lifting-chain in another line, substantially as specified.

8. In a machine-gun, in combination with a feed-chain and firing-spindles, lifting mechanism consisting of disks bearing chains upon each side of the barrels, ratchets secured to the disks, pawls in contact with the ratchets, a slide for oscillating the pawls, and a cam rotated by a crank for oscillating the slide, substantially as specified.

9. In a machine-gun, in combination with a feed-chain and firing-spindles, lifting mechanism consisting of disks bearing chains upon each side of the barrels, ratchets having oppositely-turned teeth secured to the disks, pawls in contact with the ratchets, levers connected with leaves bearing the pawls, a slide connected with the levers, and a cam rotated by the crank for oscillating the slide, substantially as specified.

10. In a machine-gun, in combination with the lifting-chains and firing-spindles, aligners for delivering the cartridges from the lifting-chains to the firing-spindles, and a reciprocating mechanism for alternately moving the aligners, substantially as specified.

11. In a machine-gun, in combination with the lifting-chains and firing-spindles, the aligners having legs fitting the ends of the cartridges for delivering the cartridges from the lifting-chains to the firing-spindles, levers connected with the slides, and cams rotated by the crank for oscillating the levers, substantially as specified.

12. In a machine-gun, in combination with the transversely-moving feeding and vertically-moving lifting mechanisms operated by the driving-shaft, reciprocating spindles bearing firing-pins, said spindles at the front end having a mortise-opening of a size to receive

a cartridge-head, and reciprocating mechanism connected with the driving-shaft for moving the spindles, substantially as specified.

13. In a machine-gun, in combination with  
5 the transversely-moving feeding and vertically-moving lifting mechanisms operated by the driving-shaft, reciprocating spindles bearing firing-pins, and supporting-plates with

hammers, pivoted levers having studs in the path of the hammers, and studs in the path of a cam rotated by the driving-shaft, substantially as specified.

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